Construction Cost Control: A Review of Practices in Malaysia

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Abstract: Construction project cost control has often been subjected to a myriad of studies, but these studies are often circulated around the scope of corrective project control. The conventional cost control system is basically corrective based, where the cost overruns have already been incurred and the company may have experienced losses, which is a little too late. The weakest form of cost control will be where the cost reports for a particular project are unable to make corrections for cost deviations incurred in that project but maybe useful for upcoming projects. In other words, it is already too late for corrective actions to be performed because the project or the particular activity has been completed. The elements of the conventional cost control system are observation, comparison of observation with some desired standard and finally corrective action to be taken. This paper attempts to identify the cost control methods and procedures that construction practitioners in Malaysia are currently utilising and aims to get feedback from the respondents whether the current approach and techniques are adequate or whether a new approach to cost control as an alternative to the conventional corrective technique is really necessary. A project control system must be able to anticipate emerging or unforeseeable problems, a deviation from the conventional project methods which are often slow where problems may already exist. This research involved face to face interviews with respondents and the methodology is wholly qualitative. The respondents are class G7 contractors registered with the CIDB where some of them are Bursa - Stock Exchange listed companies. The outcome of the research revealed that effective cost control procedures, practices and approaches are seriously lacking and these are no different from practices in some countries. Contractors seem to adopt the strategy of conservatism as far as cost control is concerned and are comfortable with the conventional method of cost control with limited involvement in information technology.

Keywords: construction, cost control, cost overruns, corrective control

1.0 Introduction

1.1 Research Background

Probably no business needs an effective cost control system more than the construction industry. Because construction companies operate on such a small profit margin due to winning contracts has undoubtedly become fiercer, cost control cannot be overemphasized. Due to these low profit margins, construction companies must capture works on large projects in order to create adequate returns on their investment. This results in a substantial financial risk and, without adequate cost control, that risk will be increased. The estimated cost of a project can be altered without major difficulties early during the project life cycle, due to no major undertakings being committed at this stage. When construction begins the budget which is a conversion from the estimate, is fixed and acts as the baseline for the contractor to control costs. Any client-directed alterations to the project at this stage will result in substantial cost increases to the client. The responsibility of the contractor to the client is to carry out the works according to the specifications, cost and schedule. The contractor at this stage is faced with one of the most

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difficult task in construction management as this is the phase that potentially has the greatest ability to increase the planned budgeted costs (Halpin & Woodhead, 1998). With maximum profit in mind, because the goals of any business cannot be achieved without profit, the contractor will have to turn to cost control for assistance. A wholly qualitative research methodology using a semi-grounded theory was selected for this study through questionnaires and company interviews. The focus of the paper is on construction project cost control with the aim of establishing cost control practices by contractors. An improved cost control model will be developed in subsequent studies aimed at reducing the contractor's unnecessary cost overruns (and increase profits).

1.2 Objectives

Cost control is about controlling expenditure to prevent over expenditure which reduces profit. In the context of the present literature, there are no definitive studies in Malaysia which establishes this; hence this study will endeavour to establish the cost control practices to control cost overruns. The research question driving this research is "what are the current construction cost control practices in Malaysia?" The objective of this research is to establish and analyze cost control practices and procedures among contractors. A model will also be developed based on the data analysed.

1.3 Scope of Work and Limitations

This study is focussed to contractor's cost control during the construction stage, and the types of cost control utilised will be dependent on the size of the projects, the size of the construction company and also the types of contracts. This study is intended to exclude the cost control methods practised by clients and consultants in the pre construction, construction and post construction stage. It will also exclude cost control procedures related to the accounting and financial management of the company. The project party under study is the civil engineering or building contractor and the project phases under investigation are the planning phase after the award of tender and the construction phase before handing over. This is because the contractor is the main player during the construction process and the construction phase is the phase that potentially has the greatest ability to cause budget overruns (as commented by Halpin & Woodhead, 1998) The project problem main categories under study are labour, materials/supplier, plant/equipment and subcontractor. Only contractors of category "G7" under the classification of contractors by CIDB and class "A" under the classification by the Contractor Service Centre (Pusat Khidmat Kontraktor or PKK), will form the sampling frame, as only larger companies are financially capable of utilising any effective cost control system.

1.4 Significance of Study

In spite of the important role cost control plays in the construction industry, no published study explored the methods being utilized by contractors in Malaysia. The vast number of registered contractors of about 70,000 in Malaysia (*CIDB 2010)* and the limited number of projects available means that competitive bidding has started to play an important role in projects awarding, and a sound cost control system to ensure maximum profitability once projects are successfully awarded. The outcome of the present study will benefit corporate managers, business practitioners, engineers and academicians by enhancing their awareness of the materiality of cost control in an organisation, and providing some insights into the prerequisites of a successful cost control procedure and the dynamics of such cost control practices and processes.

2.0 PROJECT COST CONTROL

Controlling cost for construction projects starts early during the project life cycle from the conception stage through to the construction stage and beyond .Logically, the time at which major cost savings can be achieved is during the pre construction stage, when the project is still at its infant stage and no major cost expenditures has been committed. During the actual construction,

any changes are likely to delay the project and lead to inevitable cost increases. Although the greatest ability to influence cost is early in a project life cycle, Halpin & Woodhead (2000) highlighted that one of the phases that potentially have the greatest ability to increase the planned budgeted cost is the construction phase, which consequently substantiate the importance of cost control (refer to Figure 1). Current project cost monitoring and control procedures are primarily intended to identify cost deviations from the project plan and taking corrective measures which means the cost overruns has been incurred, where Halpin (1985) referred to this concept of cost control as management by exception.

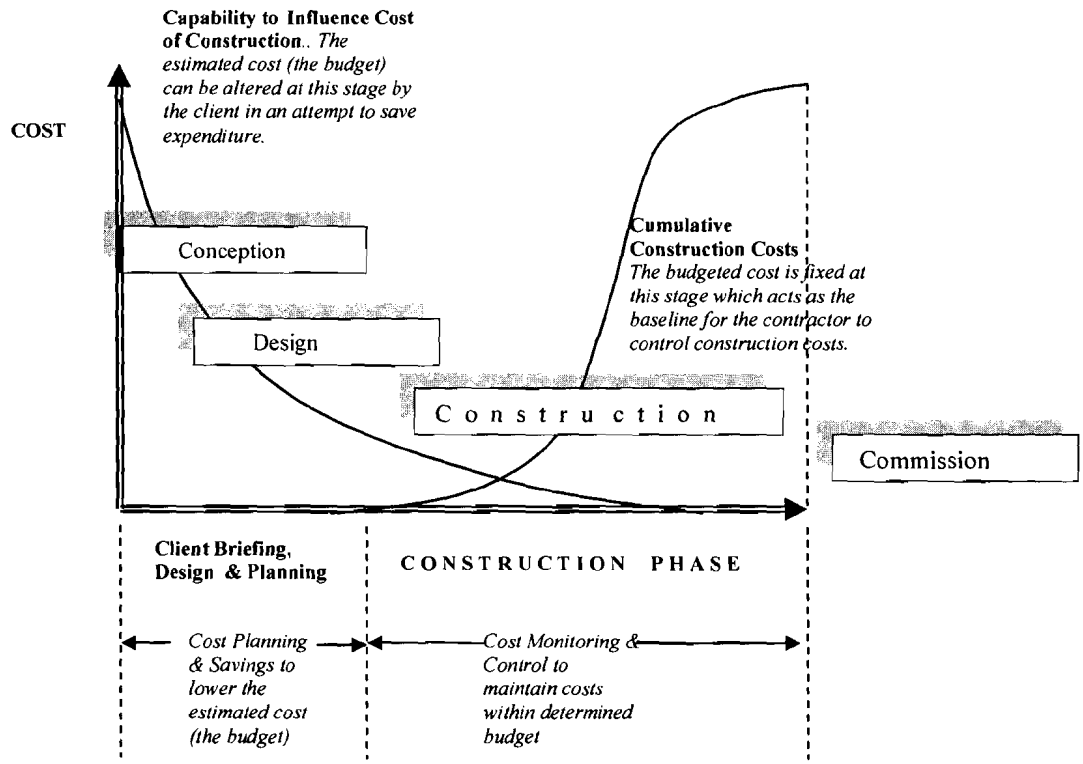

Fig 1: Capability to Influence Cost of Projects.
Source: Adapted from Cost & Value Management in Projects (Venkataraman & Pinto, 2008) ; Doctoral Thesis (Bender, 2000).

Current thoughts and practices on project control are mostly based on corrective measures. Nikander & Eloranta (2001) highlighted that the conventional methods of project control such as trend analysis are based on what has already has taken place, i.e. they are unable to perceive unforeseeable changes, emerging problems or situations that are surprising or develop outside the scope of the project plans. This suggests that the existing systems only focus on developing performance standards (e.g. budgeted costs or budgeted time), calculating and comparing the variances of items of work that has already been carried out. They are not able to prevent the occurrence of potential problems, which is one of the vital attributes of any control process.

The classic or conventional cost control procedures are usually done through the usual monitoring, reporting and comparing procedures. For any undesirable situation to have taken

place first then only the rescue efforts arrive (in the form of a corrective action), this procedure is totally unacceptable and undesirable for an effective cost control system. The cost control process should not be dormant, but it should always be active, alive and always functioning especially during the construction stage. According to J.D Ferry et al (1999) the basis of real time cost control is monitoring and reporting at regular intervals, hence cost control requires not just a record of costs incurred to date but also the likely eventual cost commitments. This include cost commitments due to current proposal for variations, other decisions taken by the design team and/or the client which will create variations and/or cause delays or difficulties in working, failure by the design team or the client to meet deadlines for supply of information.

In Malaysia, an academic research was carried out by Mansur & Mohamad (2006) to develop an assessment tool for monitoring project performance which clearly falls under the category of project (cost) control by corrective action. The larger contracting companies (e.g. those listed on the Bursa) will have clear guidelines and strategies to cost control and they utilise more sophisticated software such as Primavera for planning and cost control where software experts will sometimes be employed. The Microsoft Project software will be mostly available to the medium to small sized contractors. Clients usually request for project plans (schedule and cost plans) before they start work. These can readily be obtained from Primavera and Microsoft Project after all data have been inputted. For smaller contractors (CIDB classification G1, G2) these planning data although submitted to the client, are not being utilised for control purposes by the contractors themselves. Cost control has not been taken seriously by smaller and some medium sized contractors. Recent studies and developments on cost control utilising up-to-date simulation models, work breakdown structure models and knowledge –based models (Al-Jibouri, 2002; Wang & Huang, 2000; Bender, 2002; Rozenes et. al., 2002; Diekmann & Tabtabai, 1992) have been a fundamental improvement in project cost control, but these techniques are still under research and development and are still a long way before they will be universally acceptable to contractors. The most recent ICT development for cost control is being undertaken by Benjaoran (2009) who produces a sophisticated and complex system which are not yet applicable to most small and medium size contractors utilising the earned value concept. Benjaoran stressed that any cost control system should require low investment, easy to use and maintain, convince the management of its benefits, target on the highest priority problem and familiar to users.

Literature have proven that the presently available cost control concept that is adopted by most project control systems is based on the thermostat analogy (Harris & McCaffer, 1992; Kerzner, 2009; Halpin, 1985) which is basically based on occurrences that have already materialised. Endeavours by various researchers Kim (2002), Hastak et. al. (1996) , Al-Jibouri (2002) and others all attempted for the improvements in cost and project control , but are still confined to concept of management by exception (corrective actions). There are however several mentions in literature of a more effective preventative methodology for project control as mentioned by Ferry et. al. (1999), Medley (1994), Nikander (2001), Bender (2000) and Kerzner (2009).

3.0 Methodology

The methodology adopted the qualitative technique utilising a semi- grounded theory approach. What most differentiates grounded theory from much other research is that it is explicitly emergent. It does not test a hypothesis as hypothesis testing arises from established theories. Rather it sets out to find what theory accounts for the research situation as it is. According to Glaser, its aim is to discover the theory implicit in the data.

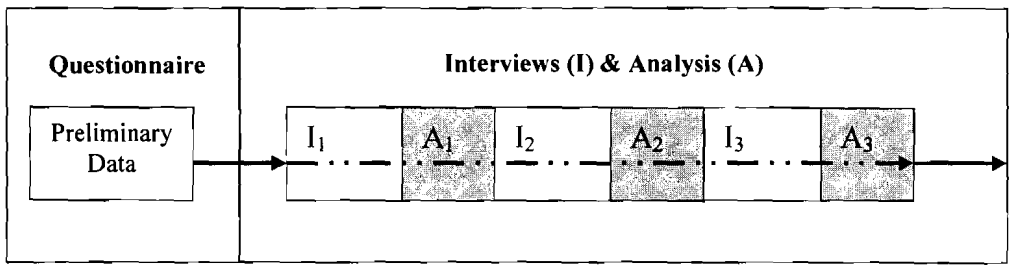

Fig 2: The Data Collection & Analysis Sandwich

Figure 2 shows the data collection process through company interviews and qualitative analysis of the results intertwined between one another in three stages. In addition to the primary data from interviews, the preliminary data collection stage also consists of data from eight structured questionnaires questions, also to be analysed qualitatively.

The Interview Schedule consists of a section comprising of items as shown in Table I that will explore the general project and cost control scenario including cost overruns.

Interview Schedule	Contents
Part A	General Project Management
	General Cost Control
	Cost Overruns

Table I: The Interview Schedule Contents

4.0 The Theoretical Model

Conventional and established cost control techniques are mostly corrective based methods which utilise information when a deviation from planned budget occurs. However there are efforts to further improve these techniques to further enhance the cost control systems or procedures. Researches by Kim (2002), Hastak et. al (1996), Al-Jibouri S. (2002), Wang & Huang (2000), Rasdorf & Abudayyeh, Miskawi (1989) , Belivieu (1984), Albonetti & Gatti M. (1986), Rozenes et al (2002), Diekmann & Al-Tabtabai (1992), Avots (1983) all attempted for improvements in cost and project control, but are still confined to the concept of management by exception where no proactive measures are taken to prevent occurrences of problems (hence cost overruns). Charoenngam & Sriprasert (2001), Ogulana & Butt (2000) and Dalakleidis (2001) who conducted researches in Thailand, Pakistan and Greece respectively reported that cost control have not been taken seriously by local contractors. However Bender (2002) incorporated the concept of risk into the cost control system, which is an attempt to introduce the preventive approach to cost control to proactively prevent cost overruns.

Almost all academic literatures (as mentioned in the previous paragraph) endeavoured to improve cost control based on corrective actions in these areas. This is confirmed by Bender (2000) who commented that several techniques established to control construction costs

unfortunately rely on controlling items which are already subjected to cost escalation. Nikander & Eloranta (2000) also highlighted that existing systems focuses on developing performance standards. Therefore academically and professionally currents thoughts and practices on construction cost control are mostly corrective based.

Referring to the model in Figure 3, it can be seen that a strong majority (80 %) utilises corrective cost control and only twelve percent (12 %) seriously utilises the preventive cost control through systematic documentation of problems, causes and solution to problems. The ninety-two percent (92%) of respondents use preventive strategies as well to control costs. The remaining eight percent (8%) uses only strategies to control cost. Corrective cost control based on the conventional theory of project control which utilise performance indicators dominates the practices by contractors. However there were efforts by a minority of contractors (large companies listed on the Bursa) who implement preventive practices and procedures as part of the cost control system.

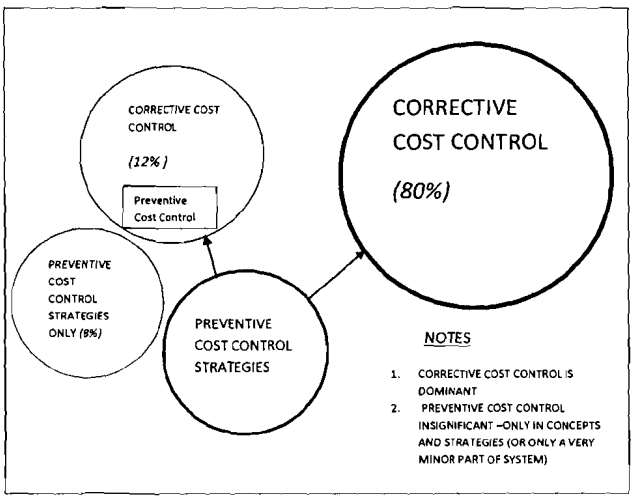

Fig 3: The Model after Analysis

5.0 Results

Cost control is a vital management element in any business environment, without which it will be impossible to harness the maximum allowable profit. It is evident that all of the respondents have their own procedures for cost control and the comparison between costs and the comparison between quantities of materials proved to be the widely used method of cost control in addition to various strategies adopted to control costs. It can also be seen that the importance of learning from past problems in the construction environment which constitutes preventive cost control exist in nearly half of the respondents, although this have not been practised seriously by the respondents in terms of detail analysis and documentation of previous problems and experiences. However these comparisons lack the utilisation of computer software which their counterparts in other industries such as manufacturing seriously depend upon. The contractors are more comfortable with the traditional method of cost control with minimal involvement in information technology.

Preventive approach to cost control is not seriously implemented but merely depended on memory without detailed analysis and documentation of problems encountered. Charoenngam & Sriprasert (2001) found the same trend in cost control utilisation among Thai contractors i.e. their current techniques have not changed much from past practices. They concluded that most cost control systems practised by contractors in Thailand are not systematised and are still at an early stage. A new classification of cost control practices have been formulated based on the literature current and past. Referring to Table 2, contractors can be classified into Grade 0, Grade I, Grade II and Grade III based on their levels of commitment to implementing cost control in their companies. It was found that eighty percent (80 %) of the respondent utilises the performance (corrective) based cost control, twelve percent (12 %) had a serious commitment towards a preventive approach although still implementing corrective procedures. Eight percent (8 %) implement cost control strategies without any particular systems or procedures utilised.

		Historical Cost Control	Managing Cost before it Occurs	
			Performance based	Prevention Based
Cost Control Grades	GRADE 0	GRADE I	GRADE II	GRADE III
Cost Control Elements	No Cost Control Only (Strategies)	Cost reports too late for corrective action	Cost reports in time for corrective action	Cost reports after preventive action
Percentage Utilisation	8 %		80 %	12 %

Table 2: Cost Control Classification.

	Categories Reaching Theoretical Saturation
1	Control for Project Success
2	Infrequent Cost Overruns Experience
3	Acknowledge Losses after Cost Overruns
4	Cause of Cost Overruns Traceable
5	Plan Monitor & Control for Prevention
6	Comparison for Cost Control
7	Cost Control is Effective
8	Need for an Improved Procedure

Table 3: Theoretical Saturation.

Table 3 shows the categories that achieved theoretical saturation during the analysis utilising the grounded theory technique. Control is an important element of management and is one of the key ingredients to a successful project management. Most of the respondents share a common opinion for control to be the most important factor for a project's success, in line with current literatures. Control as explained by the respondents encompasses time and schedule control, quality control, material control, financial and cost control. Cost overruns that occur in certain work areas of a project such as excavations, concreting or site clearance does not mean that the

project will experience losses upon completion of the project. Most respondents commented that losses in a particular work area can be balanced by savings in another work area. So once a cost overrun has been detected in one area of work, the contractor has to be extra careful and be more alert in other areas of work in order to generate savings to neutralise the effects of the cost overrun, of course without offsetting the quality of materials and workmanship as laid down by the drawings and specifications. Cost overruns as a result of client's variation orders normally pose no problems to the contractor, as the client will normally be liable to claims from the contractor. But claims that the client is not liable for claim from the contractor will be those resulted from the contractors own fault, carelessness and negligence. Most of the respondents agree that nothing can be done about these loses at the moment except to acknowledge it and bear the losses. Comparison involves comparing figures, figures established during the planning stage and figures actually obtained from site as the construction works progress. The planned figures or the budget were obtained from the project cost estimate prepared for tendering, with some modifications.

The cost of the actual work done on site is compared to the budgeted cost, the negative variance will be the cost overrun. For this method of cost control to be effective, a particular work should be further itemised or broken down into discrete activities for a more detailed comparison. Also the comparison should be carried out at regular intervals and regularly say weekly or monthly. For the larger companies there will be a committee responsible for checking the comparison and variances. One technique of comparison is the use of S-curves to control cost, check progress and establishing cash flows involving claims from client and payments to the subcontractor and the suppliers. S -curves are also used to prepare progress claims. Comparison of quantity of materials in the bill of quantities (BQ) with the actual quantities placed in orders is a common method for cost control, a surplus of materials consumption on site will require verification for additions otherwise it indeed constitutes a cost overrun. Rather than taking a conservative stand, most of the respondents share the opinion that their current cost control system/procedures need to be updated and improved in order to be more profitable as the construction industry becomes more competitive with time, due to the reduced number of available projects and increasing number of contractors. They also agreed the impact of computerisation and information technology on other industries had been immense and the construction industry has no other choices but to follow suit.

6.0 Conclusions

A total of eight (8) categories achieved theoretical saturation from the study carried out. It is evident from the analysis that most contractors have their own methods for cost control and the comparison between costs (budgeted and actually spent) and the comparison between quantities of materials (ordered and actually used) is the widely used method for cost control (which is based on the corrective method of control). In addition to the methods mentioned above, various strategies adopted to control costs are wastage control and "patching up". Common comparison techniques utilised include S-curves, earned value and cost variance techniques. These comparisons lack the serious utilisation of current computer software specifically developed for cost control (although some utilises Microsoft Excel). The contractors are more comfortable with the conventional method of cost control with limited involvement in information technology, where more than half of the contractors surveyed do not utilise any form of computer software for cost control. Those who use computers, utilises Microsoft Excel, Microsoft Project and Primavera (rare) for cost control. However most of the contractors utilises computer software for scheduling purposes.

It can also be seen that the existence of preventive cost control efforts by some contractors, which exist in nearly half of the contractors, although this have not been practised seriously by them in terms of detailed analysis and documentation of previous problems and experiences. Preventive approach to cost control is not seriously implemented but merely depended on memory without detailed analysis and documentation of problems encountered. Most of the contractors are satisfied with their current method of cost control and described them as generally effective without any major problems and are able to deal with cost overruns effectively. Their verification of the effectiveness of the procedures include the ability to monitor financial & physical progress, cost overruns that are acceptable, identification of the source of the cost overruns, the knowledge when cost overruns will occur, the ability to know the overall status of the project cost expenditure and the ability to know the cost performance. The contractors adopting the strategy of conservatism for cost control and resistant to change in the construction industry as have also been confirmed by Charoenngam & Sriprasert (2001) that cost control systems for Thai contractors had not changed much from past practices. Ogunlana & Butt (2000) and Dalakleidis (2001) have also found the practice of contractors in Pakistan and Greece utilising inaccurate cost control methods instead of the standard acceptable methods. Although generally satisfied with the current cost control practices, nevertheless, improvements are vital especially in the early detection of potential project problems (hence potential cost overruns) leading to an even better cost control.

A new classification of cost control practices and strategies by construction contractors have been formulated based on the literature current and past which can identify the level of commitment contractors have towards controlling their project costs. Referring to Table 2, contractors can be classified into grades based on their levels of commitment to implementing cost control for their projects. From the outcome of the research, a strong majority of the contractors fall into cost control Grade II i.e. corrective –based utilisation (by comparison of performances). This shows that Malaysian contractors favour a conservative attitude towards cost control in particular (and project control in general). The currently available common methods for project control in project management have not improved substantially during the past decades except for project risk management, where surprise factors are usually excluded from examination (Nikander, 2001). Nikander also stressed that a major drawback of existing methods of control and forecasting is that they are based on past history and hence are always somewhat late.

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